

December 22, 2011

VIA E-MAIL

Matthew Schneider, County of San Diego Department of  
Planning and Land Use  
5201 Ruffin Road, Suite B  
San Diego, California 92123  
[Matthew.schneider@sdcounty.ca.gov](mailto:Matthew.schneider@sdcounty.ca.gov)

Re: Invenergy Comments on the Draft Environmental Impact  
Report for Wind Energy Ordinance Amendment POD 10-  
0007 (SCH No. 2009-00-03), November 2011

Dear Mr. Schneider:

Thank you for allowing Invenergy the opportunity to provide comments on the draft EIR supporting the County's proposed amendment of its Wind Energy Ordinance and a proposed General Plan Amendment to address energy projects. Invenergy would like to express its support of the County's efforts to facilitate the use of renewable wind energy within the County. Development of renewable energy is crucial to meet the requirements of AB 32, the California Global Warming Solutions Acts passed and signed into law in 2006, which was developed to reduce greenhouse gas emissions to 1990 levels by 2020. Renewable energy projects in San Diego County are critical if California is to achieve its goal of providing 33 percent of its energy from renewable sources by 2020.

O-1

Invenergy strongly supports the objective of the proposed amendments, which the DEIR defines as facilitating "the development of wind turbines in an effort to help meet the current and future federal and state goals for renewable energy." At the same time, Invenergy has concerns with the proposal to base permitting decisions on compliance with new C-weighted noise standards, which Invenergy believes are being used improperly. The comments below are provided to identify sections of the DEIR that need clarification and to point out problems with the technical analysis of noise used in the DEIR. On that latter issue, Invenergy has enclosed comments on the noise analysis in the DEIR prepared by HDR Engineering, Inc. ("HDR").

O-2

1. Figure 1-10b of the DEIR appears to show a minimum setback of three times the turbine height or 600 feet (whichever is greater) from the edge of a unit's rotors to a residence or civic use type building structure. The setbacks identified in the figure appear to be inconsistent with "Appendix A" Zoning Ordinance Amendments Section 6952(c) which states that setbacks shall be measured from "closest point on the base or support structure for each tower" and that the minimum setback from residences and civic buildings "shall be a distance equal to 1.1 times the wind turbine height."

O-3

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|---|------|
| 2. Page 2.1-16 of the DEIR claims that large wind projects may result in significant “shadow flicker” effects if sensitive receptors are within 2000 meters (6,562 feet) of the proposed turbines. The DEIR provides no support for this claim.   | O-4  |
| 3. Page 2.6-42 of the DEIR claims that “Large wind turbines can be the source of wildfire ignitions due to, short-circuits, collection line failure, turbine malfunction or mechanical failure, and lightning.” Again, the DEIR cites no evidence to support this claim.  | O-5  |
| 4. Mitigation measure M-HAZ-1 of the DEIR addressing wildland fires states that “examples of standard mitigation measures within the County Guidelines include: installation of fire suppression systems . . .” (Page 2.6-50). Again the DEIR cites no evidence for this mitigation measure and Invenergy requests that the County provide the research and/or literature which shows that the installation of fire-suppression systems in wind turbines is necessary to mitigate fire risk. Our experience is that there have been very few instances of turbine fires of any kind occurring on later model machines. Proper maintenance and housekeeping is the best preventative measure to avoid an excessive heating event from developing and potentially causing a fire. | O-6  |
| 5. Page 2.6-52 of the DEIS claims that “stray voltage could occur if the electrical equipment in the turbines is not maintained properly. Induced current or stray voltage has the potential for adverse health effects if not properly grounded.”  | O-7  |
| 6. On page 2.8-3 the DEIR states that “there is no universally accepted scientific method of measuring wind turbine noise. However, due to the low frequency components, the C-weighted scale has been determined by the County as most appropriate to measure the potential for noise impacts.”  | O-8  |
| The County’s approach ignores actual in-field data showing that modern wind turbines do not produce high levels of low-frequency noise. This issue is discussed in greater detail in the enclosed report prepared by HDR. The bottom line is that, by including a C-weighted sound limit and by defining the background level too narrowly, the amended Ordinance could result in serious impacts to the ability of developers to finance and construct wind energy projects. Given that the stated purpose of the amendments is to foster alternative energy projects, this result directly undermines that purpose.   | O-9  |
|   | O-10 |
| 7. Section 17, section 6952(g) states “A large wind turbine shall comply with Federal Aviation Administration height requirements and day and night marking requirements and shall not create an airport hazard or interfere with military or emergency services aviation operations, such as aerial firefighting.” We suggest revising this section to read “A large wind turbine shall comply with Federal Aviation Administration requirements.” The FAA does not impose height requirements, and additionally, the Department of Defense and the FAA have a process for determining hazards and interference with military operations.  | O-11 |

## Draft Responses to Comments

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Sincerely,



Bo Alley

Development Manager, Invenergy LLC

Attachment: HDR memo: [San Diego County Draft Wind Ordinance –Noise Comments](#)



## Memo

Date: December 21, 2011

### Re: San Diego County Draft Wind Ordinance –Noise Comments

HDR offers the following comments on the proposed County of San Diego draft wind ordinance.

#### Low Frequency Noise

The County misunderstands the actual low frequency content in wind turbine noise, and proposes unnecessary and inappropriate noise limits. Low-frequency noise occurs naturally in the outdoor environment (i.e. when the wind blows, at waterfalls, as large rivers flow, ocean waves crashing at beaches, and more). Numerous, common, man-made noise sources also emit low-frequency noise (i.e. cars, trucks, motorcycles, air conditioners, peaking generation plants that use gas- or oil-fired turbines, etc.). While older, down-wind configured wind turbines were once recognized as low-frequency noise sources, modern up-wind configured wind turbines do not emit intense amounts of low frequency noise<sup>1</sup>. Modern up-wind configured wind turbines are recognized as emitting less low-frequency noise than older down-wind configured wind turbines<sup>2</sup>.

Epsilon Associates also studied post-construction noise measurements of operating turbines and concluded that: “Outdoor measurements of GE 1.5sle wind turbines under high output and low ground wind speed (which minimized effects of wind noise) at 1000 feet indicate that infrasound is inaudible to the most sensitive people (more than 20 dB lower than median thresholds of hearing); that outdoor equivalent ANSI/ASA S12.2 perceptible vibration criteria are met; that the low frequency sounds are compatible with ANSI S12.9 Part 4 levels for minimal annoyance and beginning of rattles; and that levels meet or are within 1 dB of outdoor equivalent UK Department of Environment, Food, and Rural Affairs (DEFRA) disturbance based guidelines for use by Environmental Health SSOIATES INC. Officers. The low frequency sound was “steady” according to DEFRA procedures and might be audible in some cases. Conclusion: There are no LFN problems from GE 1.5sle wind turbines at 1000 feet or beyond.”<sup>3</sup>

Infrasound is inaudible low frequency noise that occurs in the lowest frequencies in the spectrum. Measurement data reported by Sonus Pty, Ltd<sup>4</sup>, compares infrasound measurements at two operating wind farms, Clements Gap (CGWF – 61 dBG and Cape Bridgewater) (CBWF – 63 dBG), with data measured at a beach in the absence of wind turbine noise. These three data

<sup>1</sup> Harvey H Hubbard and Kevin P. Shepherd, “Wind Turbine Acoustics”, NASA Technical Paper 3057, DOE/NASA 20320-77, December 1990.

<sup>2</sup> Anthony L. Rogers, Ph.D., James F. Manwell, Ph.D., Sally Wright, M.S., PE, “Wind Turbine Acoustic Noise” prepared by the Renewable Energy Research Laboratory, Department of Mechanical and Industrial Engineering, University of Massachusetts at Amherst, January 2006.

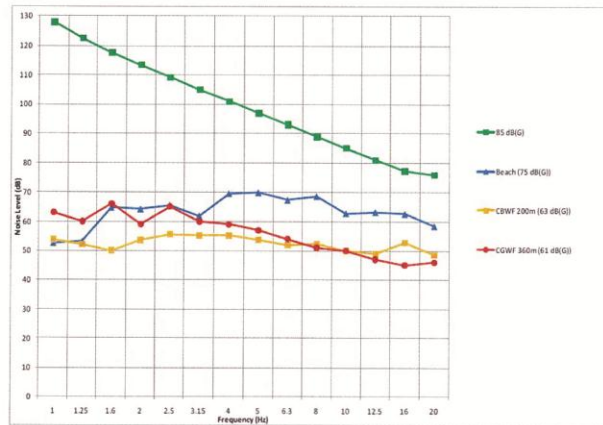
<sup>3</sup> Epsilon Associates, A Study of Low Frequency Noise and Infrasound from Wind Turbines, May 2009.

<sup>4</sup> Sonus Pty, Ltd. in “INFRASOUND MEASUREMENTS FROM WIND FARMS AND OTHER SOURCES” prepared for Pacific Hydro Pty Ltd, November 2010.



sets are compared with the internationally recognized audibility threshold for infrasonic noise in Figure 1.

**Figure 1. Infrasound Summary Results from Two Australian Wind Farms**



Summary Graph – Infrasound measurement results from two Australian wind farms (Clements Gap at 61 dB(G) and Cape Bridgewater at 63 dB(G)) compared against measurement results at a beach (measured at 75 dB(G)) and the internationally recognised Audibility Threshold (85 dB(G))

The Sonus measurement results indicate that the levels of infrasound in the vicinity of the two Australian wind farms are well below the audibility threshold of 85 dB(G) established by international research.<sup>5</sup> The measurement results are of the same order as that measured from a range of sources including a beach.

Measurements of operating wind turbines published by Epsilon and Associates (Epsilon) also indicate that wind farms at distances beyond 1,000 feet meet the ANSI (American National Standards Institute) standard for low frequency noise in bedrooms, classrooms, and hospitals, and there should be no window rattles or perceptible vibration of lightweight walls or ceilings within homes. In homes there may be slightly audible low frequency noise (depending on other sources of low frequency noise); however, the levels are below criteria and recommendations for low frequency noise within homes.<sup>6</sup> The wind turbine types measured by Epsilon include the GE 1.5sle and Siemens SWT 2.3-93.

<sup>5</sup> Sonus Pty, Ltd. in "INFRASOUND MEASUREMENTS FROM WIND FARMS AND OTHER SOURCES" prepared for Pacific Hydro Pty Ltd, November 2010.

<sup>6</sup> Epsilon Associates, A Study of Low Frequency Noise and Infrasound from Wind Turbines, May 2009.

O-16  
Cont.

O-17

In summary, low frequency noise is a naturally-occurring phenomenon that is also emitted from man-made noise sources including wind turbines. Modern wind turbines emit low, acceptable levels of low-frequency noise. Environmental noise limits in use by state and federal agencies that regulate environmental noise throughout the nation almost exclusively use A-weighted decibels (dBA) in their noise limits. This includes the Federal Aviation Administration (FAA), which regulates noise from jet engines (which emit substantial amounts of low frequency noise).

O-18

Reliance upon use of C-weighted noise limits is also inconsistent with the General Plan Part VIII Noise Element which states that the “most appropriate basic unit of measure for community noise is the A-weighted sound level [...]”

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The County has not demonstrated why it is necessary to regulate noise emissions from wind turbines (noise sources which emit acceptable levels of low-frequency noise) using C-weighted limits. Use of C-weighted noise limits is not rational or reasonable in light of published data demonstrating that wind turbines emit acceptable levels of low-frequency noise. In energy requests that the County published a detailed technical document that provides measurable, factual evidence supporting the need for C-weighted noise limits. In lieu of that demonstration, the proposed use of C-weighting is unsupported, unreasonable, arbitrary and capricious.

O-20

### Proposed Noise Descriptors

The County proposes noise descriptors that mischaracterize the existing ambient noise environment, and prohibit any potential increase over existing ambient noise levels. Existing ambient C-weighted sound levels often exceed the  $L_{A90}$  of the quietest 10 minutes. Therefore the County’s proposed use of the  $L_{90}$  as a basis for post-construction C-weighted sound levels results in C-weighted sound level limits below the existing  $L_{ceq}$ . Under this framework, there is no allowable increase over existing noise levels. This is excessively restrictive. The County has not demonstrated their understanding of the ambient noise environment (i.e. monitoring data); therefore a reasonable person can not assess the basis or need for these overly-restrictive proposed noise limits. On this basis, these proposed limits seem unsupported, unreasonable, arbitrary and capricious.

O-21

Based on HDR’s measurements of the numerous wind farm project areas, the ambient pre-construction noise environment frequently exceeds the County’s proposed low frequency regulations. The net effect of these proposed limits and the resulting off-set distances are that, (a) residents will not hear wind turbines when they operate because (b) they will not exist in San Diego County because it will be impossible to economically site them in the county. The spectra-imbalance noise limits cited in San Diego County’s proposed revisions to the zoning ordinance are inconsistent with noise limits accepted by other local and state agencies. Typical noise limits are based on absolute or relative limits that regulate the increase in sound level.

O-22

O-23

The potential prohibition on increases over the existing noise level is inconsistent with existing San Diego County regulations and also inconsistent with how environmental noise is regulated by most other state and federal agencies in the United States. The use of such noise limits would require large wind turbine setback distances in excess of one (1) mile. In conjunction with

O-24

stricter noise limits, San Diego County's revised noise ordinance requires that the acoustical assessment compare worst case noise emissions with the quietest measureable background levels. Such comparisons create an inaccurate portrayal of normal operating conditions and existing noise levels, and are inconsistent with the accepted environmental review practices in the field of environmental acoustics.

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O-24  
Cont.

A widely accepted absolute noise limit for outdoor environments is 55 dBA  $L_{dn}$  for land uses where overnight sleep occurs, established by the EPA<sup>7</sup>. The day-night noise level ( $L_{dn}$ ) is a 24-hour average noise level that is calculated using 24 consecutive hourly equivalent noise levels ( $L_{eq}$ ) and adds a 10 dBA penalty to nighttime  $L_{eq}$  values between the hours of 10:00 p.m. and 7:00 a.m. (in recognition of the annoyance associated with nighttime noise). The EPA considers 55 dBA on an  $L_{dn}$  basis to be sufficiently low as to minimize or eliminate any potential for sleep interference, indoor/outdoor speech interference, and annoyance. These EPA limits and the guidance they are based on are used as the basis for other Federal regulatory noise limits, including FTA<sup>8</sup>, HUD<sup>9</sup>, and FHWA<sup>10</sup>, and also by numerous states throughout the nation including those with wind energy developments<sup>11</sup>.

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Kamperman and James, the authors of the document upon which the draft noise ordinance is based, suggest that wind turbine noise, by virtue of its nature, requires more stringent noise guidelines than other noise sources – a suggestion in conflict with the opinions of the acoustics, audiology, and health communities<sup>12,13,14,15</sup>.

↑  
O-26

The proposed low-frequency noise limits are also inconsistent with noise standards for recognized sources of low frequency noise such as aircraft<sup>16</sup>, freight trains<sup>17</sup>, vehicular traffic<sup>18</sup>, race tracks, HVAC equipment, and other industrial noise sources.

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O-27

### Misrepresenting Existing Ambient Noise Levels

7 US Environmental Protection Agency, "Public Health and Welfare Criteria for Noise", July 27, 1973, 550/9-73-002

8 Federal Transit Administration, "Transit Noise and Vibration Impact Assessment", May 2006, FTA-VA-90-1003-06

9 US Department of Housing and Urban Development, "The Noise Guidebook", March 1985, HUD-953-CPD

10 Federal Highway Administration, "Highway Traffic Noise Analysis And Abatement Policy And Guidance", June 1995

11 Minnesota Pollution Control Agency, "CHAPTER 7030, Noise Pollution Control", Minnesota Rules.

12 Dr. Geoff Leventhall, "Infrasound from Wind Turbines – Fact, Fiction, or Deception", 2006, Canadian Acoustics, Volume 34, Number 2.

13 George Hessler, "Rebuttal Testimony of George Hessler on Behalf of Wisconsin Electric Power Company", 10-20-09, Wisconsin Public Service Commission Ref#:121869

14 Dr. Geoff Leventhall, "Comments on the Kamperman and James Paper: "How to" Guide to Siting Wind Turbines to Prevent Health Risks from Sound, 10-20-09, Wisconsin Public Service Commission Ref# 121890

15 Dr. Mark Roberts and Dr. Jennifer Roberts, "Evaluation of the Scientific Literature on the Health Effects Associated with Wind Turbines and Low Frequency Sound", October 20, 2009, Wisconsin Public Service Commission Ref# 121885

16 Federal Aviation Administration, "14 CFR Part 150, Airport Noise Compatibility Planning", 2004.

17 US Surface Transportation Board, environmental regulations at 49 CFR 1105.7

18 Federal Highway Administration, "Highway Traffic Noise Analysis And Abatement Policy And Guidance", June 1995



San Diego County's proposed wind turbine noise requirements and ordinance will likely misrepresent existing noise levels. The proposed section addressing allowable turbine noise emission above pre-existing noise conditions evaluates existing outdoor noise levels using a 10-minute  $L_{90}$ <sup>19</sup> metric during the quietest hours of the night. The use of the  $L_{90}$  to represent existing noise levels excludes 90% of common noise sources in the existing noise environment. This could include wind noise, noise from insects, animals and intermittent traffic, and other common noises. The proposed ordinance then assumes that the lowest 10% of noise levels measured during very short-term durations during the quietest hours of the night are representative of typical ambient outdoor noise levels. This is analogous to putting a finger in each ear, blocking 90% of the sound and then saying that what you hear is representative of typical ambient outdoor noises. Clearly this is unreasonable depiction of ambient noise conditions misrepresents ambient conditions.

O-27  
Cont.

O-28

More accurate metrics which establish a baseline environmental sound level are the hourly  $L_{eq}$ <sup>20</sup> and 24-hour  $L_{dn}$ <sup>21</sup>. Current acoustical standards, outlined in ANSI S12.9 Part 2 call for use of long term measurements and metrics such as  $L_{dn}$  in environmental assessment and planning. Long term measurements which capture noise produced by local traffic, aircraft overflights and common everyday activities are a more accurate representation of current conditions and pre-existing low frequency noise. The  $L_{eq}$  and  $L_{dn}$  metrics are more appropriate for characterizing the ambient outdoor noise environment. The draft wind turbine noise requirements and ordinance should be revised to correct this misrepresentation.

O-29

ANSI S12.9 Part 3 defines background sound as the all-encompassing sound associated with a given environment *without contribution from the source or sources of interest*<sup>22</sup>. Pre-construction measurements are performed without the operation of the proposed project, therefore all existing noise sources should be considered part of the existing noise environment. Current San Diego County noise regulations require the use of the community equivalent sound level, CNEL, as a basis to assess increase over existing. This metric is not in widespread use throughout the nation; its use is uncommon outside of California. In summary, the proposed wind turbine ordinance is utilizes metrics which are inconsistent with current regulation and misrepresent existing ambient sound levels.

O-30

### Internal Inconsistency Issues

O-31

<sup>19</sup> An  $L_{90}$  is defined as the noise level exceeded 90% of the time, therefore for 90% of the measurement period the noise level exceeds the  $L_{90}$ .

<sup>20</sup>  $L_{eq(h)}$  represent a constant sound that, over an hour, has the same acoustic energy as the measured time-varying sound level.

<sup>21</sup> 24-hour  $L_{dn}$  is a noise weighted descriptor created to quantify the manner in which sound is perceived over a 24 hour period. The  $L_{dn}$  is equivalent to the  $L_{eq(24)}$  with 10 dB added to nighttime sound levels between the hours of 10:00 PM and 7:00 AM to account for people's greater sensitivity to sound during nighttime hours.

<sup>22</sup> American National Standard/Acoustical Society of America, "Quantities and Procedures for Description and Measurement of Environmental Sound. Part 3: Short-term measurements with an observer present, April 21, 2008, ANSI/ASA S12.9-1993/Part 3.



The draft ordinance regulates wind turbines as if they are major sources of harmful levels of low-frequency noise, yet the County acknowledges that there is no scientific, published, causal relationship between exposure to wind turbine noise and adverse human health effects. The Kamperman and James's document ("The 'How To' Guide to Siting Wind Turbines to Prevent Health Risks from Sound") was commissioned by opponents of wind energy development and much of its contents are unsupported by peer-reviewed, published scientific literature. A recent review of published medical literature using the Pub Med database concluded that there is no documented, peer-reviewed, published evidence that wind turbines generate noise that negatively affects human health. The levels of low frequency noise emitted by modern up-wind turbines have been shown to be below levels that are harmful to human health. In fact, the County acknowledges there is no credible scientifically proven causal relationship between exposure to wind turbine noise and adverse effects to human health.

O-31  
Cont.

Case studies cited by Kamperman and James to support the hypothesis that wind turbines are a potential for health risk in actuality due not establish a causal relationship between wind turbine generated noise and adverse health effects. Self-reported, pre-selected claims of health effects could potentially serve as a case study—to simply draw attention to a stimulus and observed conditions. However, there is no basis for assuming that these self-reported claims establish a cause and effect relationship. Modern epidemiological study methods used every day to assess public health issues require extensive study by numerous, unrelated practitioners, and painstaking levels of scrutiny by additional, numerous, and unrelated practitioners before they suggest cause and effect relationships. The claim that wind turbines cause adverse health effects lacks factual support with peer-reviewed, published, scientific data; therefore these claims should not be used to make environmental policy. In fact, it is now recognized that the self-reported health effects are consistent with common responses to annoyance to noise<sup>23</sup>. It is also recognized that individuals with disapproval of and no control over stimuli are likely to be annoyed by it. In other words, people who self-report health effects associated with exposure to wind turbine noise are also likely to be the people who opposed the wind turbines. This concept is globally accepted by all but a few who discount it in an attempt to bolster their claims of "wind turbine syndrome".

O-32

#### **Amount of Post-Construction Noise Monitoring is Excessive**

If required, post-construction measurements for wind turbine projects are typically performed within 12-18 months of commercial operation. Acoustical commissioning measurements ensure that the project is in compliance with local regulations. Increases in noise emission for wind turbine generators are typically associated with mechanical malfunction or need for maintenance. Periodic study every 5 years is unnecessary unless a change in operations is proposed.

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<sup>23</sup> Loren D Knopper and Christopher A Ollson, "Health effects and wind turbines: A review of the Literature", *Environmental Health* 2011, 10:78

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## Response to Comment Letter O

Invenergy, LLC  
Bo Alley  
December 22, 2011

- O-1** This comment is introductory in nature and does not raise a significant environmental issue for which a response is required.
- O-2** This comment does not raise a significant environmental issue for which a response is required.
- O-3** The County acknowledges and appreciates this comment. Figure 1-10b has been revised to ensure it consistent with the proposed ordinance amendment.
- O-4** The County acknowledges and appreciates this comment. References utilized for shadow flicker analysis have been incorporated into the Final EIR to document (NEED TO COORDINATE WITH DUDEK ON SOURCES)
- O-5** The County acknowledges and appreciates this comment. San Diego County has an extensive and well documented history and experience with wildfires. Utility scale power transmission lines are known to have contributed to the 2007 firestorm which consumed approximately 369,000 acres of County land. Large turbines which generate and or transmit electrical power may be an ignition source for wildfires.
- O-6** The County acknowledges and appreciates this comment. Installation of fire suppression systems is cited as an example of standard mitigation measure within the County Guidelines. The proposed ordinance does not require all future large turbines to install fire suppression systems. Specific mitigation measures for large turbine projects will be determined on a case by case basis during the discretionary review process.
- O-7** The County agrees with this comment.
- O-8** The County agrees with this comment.
- O-9** This comment does not raise a significant environmental issue for which a response is required.
- O-10** The County does not concur with this comment. The County's analysis (see response to comments Appendix X) concludes that both utility scale and non utility scale projects are viable under the proposed ordinance. The commenter's opposition to the

## Draft Responses to Comments

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proposed C-weighted noise provisions will be included in the final EIR for review and consideration by the Board of Supervisors.

- O-11** The County acknowledges and appreciates this comment. The large turbine height provision has been revised to clarify that “A large turbine shall comply with Federal Aviation Administration ~~height~~ noticing requirements and day and night marking requirements...”
- O-12** This comment does not raise a significant environmental issue for which a response is required.
- O-13** This comment does not raise a significant environmental issue for which a response is required.
- O-14** The County acknowledges and appreciates this comment. Staff agrees that modern up-wind configured wind turbines may emit less low frequency noise than older down-wind configured wind turbines. If this is the case, then modern day wind turbines would be able to demonstrate consistency with Section 6952.f within the proposed Wind Energy Ordinance.
- O-15** The County acknowledges and appreciates the reference to the Epsilon Associates Study. The County considers The How to Guide to Siting Wind Turbines (October 28, 2008) by Kamperman and James and the Proposed Criteria In Residential Communities for Low-Frequency Noise Emissions From Industrial Sources (Revised 2004 June 11; accepted 2004 June 15) by George F. Hessler Jr., as reliable resources that specify that an exceedance of a 20 decibel difference between the long-term background levels (dBA) and the Leq C-weighted would result in low frequency impacts to be excessive.
- O-16** The County appreciates this information. The comment does not identify deficiencies in the DEIR.
- O-17** The County acknowledges the data provided. This is the kind of data that can be provided during the discretionary review of specific large wind turbine projects that request a Major Use Permit. It does not affect the County’s proposed provisions or the adequacy of the DEIR.
- O-18** The County acknowledges and appreciates this comment. Although A-weighted decibels (dBA) are widely used to regulate environmental noise concerns, the County has incorporated the C-weighted (dBC) as a unit measurement to account for low frequency components associated with wind turbines.



- O-19** The County General Plan Noise Element utilizes an A-weighted Community Noise Equivalent Level (CNEL) unit of measurement and the County Noise Ordinance uses an A-weighted Leq (average sound level). The draft Wind Energy Ordinance includes a C-weighting (dBC) unit of measurement for evaluating low frequency sounds associated with wind turbines.

Although existing County Noise standards use an A-weighted unit of measurement, incorporating the C-weighting (dBC) in the draft Wind Energy Ordinance is necessary to identify any low frequency concerns. The C-weighting thresholds provided in the Draft Wind Turbine Ordinance would not conflict with the General Plan Noise Element or the County Noise Ordinance.

- O-20** Although the most common frequency weighting is A-weighting (dBA), the C-weighting unit of measurement is common when evaluating low frequency sounds.

- O-21** The County acknowledges and appreciates this comment. The County considers the quietest 10 minute measurement as representation of the existing ambient noise levels representing residences located in very quiet rural environments. Ambient measurements conducted would show comparable results comparing the L90 and the 10 minute measurements.

The County Draft Wind Turbine Ordinance would regulate the rural environment impacts from these new low frequency noise sources and address any potential loss of the existing peaceful and tranquil sound environment. Based on Proposed Criteria In Residential Communities for Low-Frequency Noise Emissions From Industrial Sources (Revised 2004 June 11; accepted 2004 June 15) by George F. Hessler Jr., an exceedance of a 20 decibel difference between the long-term background levels (dBA) and the Leq C-weighted would result in low frequency impacts to be excessive.

- O-22** The County's intent of the Draft Wind Turbine Ordinance is not to preclude the development of wind farms but to allow such development that would not cause any excessive low frequency noise impacts to adjacent non-participating properties.

- O-23** The County acknowledges and appreciates this comment. Although local agencies do not currently have existing regulations for low frequency noise impacts associated with wind turbine farms, the Town of Montville, and the Town of Dixmont currently utilizes the spectra-imbalance noise limits.

- O-24** Other states have incorporated the spectra-imbalance. Please see response to comment O23. The County considers the quietest 10 minute measurement as representation of the existing ambient noise levels representing residences located in

## Draft Responses to Comments

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very quiet rural environments. Ambient measurements conducted would show comparable results comparing the L90 and the 10 minute measurements.

- O-25** The County acknowledges and appreciates this comment. The utilization of an A-weighted Ldn (day-night) unit of measurement would not properly measure the low frequency noise associated with wind turbines. C-weighting (dBC) is typically used for measuring low frequency sounds.
- O-26** The County cannot comment on whether or not low frequency noise standards should be set for sources such as aircraft, freight trains, vehicular traffic, and HVAC equipment. For this project, the County is not proposing to place these types of noise generators in the rural areas of its jurisdiction. The proposed project will result in development of large wind turbines which are known to produce low frequency noise. The County has included the C-weighted noise limitations to address this issue and has discussed its applications in the DEIR pursuant to CEQA.
- O-27** County noise guidelines for the Draft Wind Turbine Ordinance are not currently available at this time. The guidelines will further clarify the measurements involving the 10 minute L90 measurement. For example, 24hr unmanned noise measurements would be required at the worst case locations and representative sites. Based on the 24hr measurement data, the applicant will identify the lowest L90 times, revisit the site at these quiet times, and conduct multiple 10 minute measurements to verify the lowest L90 at these sites. This would ensure the L90 measurements are representative of the quietest background noise environment at the site.
- O-28** Please see response to comment O27.
- O-29** The County acknowledges and appreciates this comment. The County is aware of other methodologies to measure the baseline environmental sound levels. For the purposes of this draft Wind Energy Ordinance, the County considers the L90 unit of measurement as an appropriate means of measuring the background noise level.
- O-30** As stated in response to comment O27, 24hr unmanned noise measurements would be required at the worst case locations and representative sites. Based on the 24hr measurement data, the applicant will identify the lowest L90 times, revisit the site at these quiet times, and conduct multiple 10 minute measurements to verify the lowest L90 at these sites. This would ensure the L90 measurements are representative of the quietest background noise environment at the site.
- O-31** The County agrees that the scientific data available to date does not demonstrate a direct casual relationship between wind turbine noise and adverse health effect.

## **Draft Responses to Comments**

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- O-32** The County agrees that the scientific data available to date does not demonstrate a direct casual relationship between wind turbine noise and adverse health effect. Furthermore the County agrees that self reported complaints are in response to the annoyance created by wind turbine noise. The County considers annoyance resulting from unwanted noise to be a significant impact. The low frequency noise provisions proposed in the ordinance amendment are intended to address impacts from low frequency noise.
- O-33** The County acknowledges and appreciates this comment which does not raise a significant environmental issue for which a response is required.

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